Application No. 10/722,164

AMENDMENTS TO THE CLAIMS:

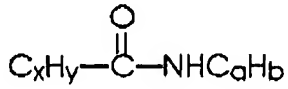
This listing of claims will replace all prior versions, and listings of claims in the application:

LISTING OF CLAIMS:

1. (Currently Amended) A phase change ink composition comprising (a) an ink carrier comprising a monoamide and a tetra-amide, and (b) oxidized pigment particles, said pigment particles having oxygen-containing functional groups on the surfaces thereof.

2. (Original) An ink according to claim 1 wherein the monoamide is stearamide, behenamide, oleamide, erucamide, behenyl behenamide, stearyl stearamide, stearyl erucamide, erucyl erucamide, oleyl palmitamide, erucyl stearamide, or mixtures thereof.

3. (Original) An ink according to claim 1 wherein the monoamide is of the formula

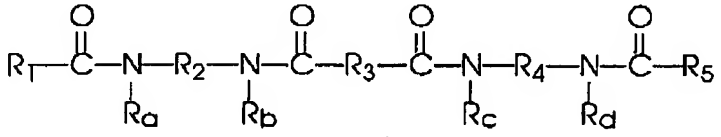


wherein x is an integer of from about 5 to about 21, y is an integer of from about 11 to about 43, a is an integer of from about 6 to about 22, and b is an integer of from about 13 to about 45.

4. (Original) An ink according to claim 1 wherein the monoamide is present in the ink carrier in an amount of at least about 8 percent by weight.

5. (Original) An ink according to claim 1 wherein the monoamide is present in the ink carrier in an amount of no more than about 32 percent by weight.

6. (Currently amended) ~~An~~ A phase change ink composition ~~according to claim 1~~ comprising (a) an ink carrier comprising a monoamide and a tetra-amide, and (b) pigment particles having oxygen-containing functional groups on the surfaces thereof, wherein the tetra-amide is of the formula



wherein R_a, R_b, R_c, and R_d each, independently of the others, is (a) a hydrogen atom, (b) an alkyl group, (c) an aryl group, (d) an arylalkyl group, or (e) an alkylaryl group, wherein R_2, R_3, and R_4 each, independently of the others, are (a) an alkylene group, (b) an arylene group, (c) an arylalkylene group, or (d) an alkylarylene group, and wherein R_1 and R_5 each, independently of the other, is (a) an alkyl group, (b) an aryl group, (c) an arylalkyl group, or (d) an alkylaryl group.

7. (Original) An ink according to claim 6 wherein at least one of the alkyl, alkylene, aryl, arylene, arylalkyl, arylalkylene, alkylaryl, and alkylarylene groups is substituted.

8. (Original) An ink according to claim 6 wherein none of the alkyl, alkylene, aryl, arylene, arylalkyl, arylalkylene, alkylaryl, and alkylarylene groups are substituted.

9. (Original) An ink according to claim 6 wherein at least one of the alkyl, alkylene, aryl, arylene, arylalkyl, arylalkylene, alkylaryl, and alkylarylene groups has at least one hetero atom therein.

10. (Original) An ink according to claim 9 wherein the one or more hetero atom is oxygen, nitrogen, sulfur, silicon, phosphorus, or a mixture thereof.

11. (Original) An ink according to claim 6 wherein none of the alkyl, alkylene, aryl, arylene, arylalkyl, arylalkylene, alkylaryl, and alkylarylene groups have hetero atoms therein.

12. (Original) An ink according to claim 6 wherein R_1 is an alkyl group with about 18 carbon atoms.

13. (Original) An ink according to claim 6 wherein R_1 and R_5 are each alkyl groups with about 18 carbon atoms.

14. (Original) An ink according to claim 6 wherein R_1 is an alkyl group with at least about 37 carbon atoms.

15. (Original) An ink according to claim 6 wherein R_1 and R_5 are each alkyl groups with at least about 37 carbon atoms.

16. (Original) An ink according to claim 6 wherein R_1 is an alkyl group with about 48 carbon atoms.

17. (Original) An ink according to claim 6 wherein R_1 and R_5 are each alkyl groups with about 48 carbon atoms.

18. (Original) An ink according to claim 6 wherein R_1 and R_5 are both $-(CH_2)_{16}CH_3$, R_2 and R_4 are each $-CH_2CH_2-$, and R_3 is a branched unsubstituted alkyl group having about 34 carbon atoms.

19. (Original) An ink according to claim 6 wherein R_1 and R_5 are both $-(CH_2)_nCH_3$ wherein n is 47 or 48, R_2 and R_4 are each $-CH_2CH_2-$, and R_3 is a branched unsubstituted alkyl group having about 34 carbon atoms.

20. (Original) An ink according to claim 1 wherein the tetra-amide is present in the ink carrier in an amount of at least about 10 percent by weight.

21. (Original) An ink according to claim 1 wherein the tetra-amide is present in the ink carrier in an amount of no more than about 32 percent by weight.

22. (Currently amended) ~~An~~ A phase change ink composition ~~according to claim 1~~ comprising (a) an ink carrier comprising a monoamide and a tetra-amide, and (b) pigment particles having oxygen-containing functional groups on the surfaces thereof, said ink further comprising a urethane.

23. (Original) An ink according to claim 22 wherein the urethane is derived from the reaction of two equivalents of hydroabietyl alcohol and one equivalent of isophorone diisocyanate.

24. (Currently amended) ~~An~~ A phase change ink composition ~~according to claim 1~~ comprising (a) an ink carrier comprising a monoamide and a tetra-amide, and (b) pigment particles having oxygen-containing functional groups on the surfaces thereof, said ink further comprising an isocyanate-derived material that is the adduct of three equivalents of stearyl isocyanate and a glycerol propoxylate.

25. (Currently amended) An ink according to ~~claim 1~~ claim 24 ~~further comprising an~~ wherein the isocyanate-derived material ~~that~~ is the product of the reaction of about 1.5 parts hydroabietyl alcohol, about 0.5 part octadecyl amine, and about 1 part isophorone diisocyanate.

26. (Currently amended) ~~An~~ A phase change ink composition ~~according to claim 1~~ comprising (a) an ink carrier comprising a monoamide and a tetra-amide, and (b) pigment particles having oxygen-containing functional groups on the surfaces thereof, wherein the monoamide is stearyl stearamide, is present in the carrier in an amount of at least about 8 percent by weight, and is present in the carrier in an amount of no more than about 50 percent by weight, wherein the tetra-amide is a dimer acid based tetra-amide that is the reaction product of dimer acid, ethylene diamine, and a long chain hydrocarbon having greater than thirty six carbon atoms and having a terminal carboxylic acid group, is present in the carrier in an amount of at least about 10 percent by weight, and is present in the carrier in an amount of no more than about 32 percent by weight, said ink further comprising (1) a polyethylene wax, present in the carrier in an amount of at least about 25 percent by weight, and present in the carrier in an amount of no more than about 60 percent by weight, (2) a urethane resin derived from the reaction of two equivalents of hydroabietyl alcohol and one equivalent of isophorone diisocyanate, present in the carrier in an amount of at least about 6 percent by weight, and present in the carrier in an amount of no more than about 16 percent by weight, (3) a urethane resin that is the adduct of three equivalents of stearyl isocyanate and a glycerol-based alcohol, present in the carrier in an amount of at least about 2 percent by weight, and present in the carrier in an amount of no more than about 13 percent by weight, and (4) an antioxidant, present in the carrier in an amount of at least about 0.01

percent by weight, and present in the carrier in an amount of no more than about 1 percent by weight.

27. (Currently amended) ~~An~~ A phase change ink composition ~~according to claim 1~~ comprising (a) an ink carrier comprising a monoamide and a tetra-amide, and (b) pigment particles having oxygen-containing functional groups on the surfaces thereof, said ink further comprising a polyethylene wax.

28. (Original) An ink according to claim 1 wherein the oxygen-containing functional groups on the surfaces of the pigment particles are acidic oxygen-containing functional groups.

29. (Original) An ink according to claim 1 wherein the oxygen-containing functional groups on the surfaces of the pigment particles are basic oxygen-containing functional groups.

30. (Original) An ink according to claim 1 wherein the oxygen-containing functional groups on the surfaces of the pigment particles are carboxylic acid groups, sulfonic acid groups, phosphonic acid groups, hydroxyl groups, phenolic hydroxyl groups, quinonic groups, lactonic groups, or mixtures thereof.

31. (Currently amended) ~~An~~ A phase change ink composition ~~according to claim 1~~ comprising (a) an ink carrier comprising a monoamide and a tetra-amide, and (b) pigment particles having oxygen-containing functional groups on the surfaces thereof, wherein the pigment particles have a primary volume average particle size of no more than about 0.5 micron.

32. (Currently amended) An ink according to ~~claim 1~~ claim 31 wherein the pigment particles have a primary volume average particle size of no more than about 0.2 micron.

33. (Currently amended) An ink according to ~~claim 1~~ claim 31 wherein the pigment particles have a primary volume average particle size of no more than about 0.12 micron.

34. (Original) An ink according to claim 1 wherein the pigment particles are present in the ink in an amount of at least about 0.1 percent by weight of the ink.

35. (Original) An ink according to claim 1 wherein the pigment particles are present in the ink in an amount of no more than about 20 percent by weight of the ink.

36. (Original) An ink according to claim 1, said ink being substantially free of surfactants and pigment dispersing agents.

37. (Original) A process for preparing a phase change ink which comprises (a) melting a tetra-amide which is solid at about 25°C; (b) admixing with the molten tetra-amide pigment particles having oxygen-containing functional groups on the surfaces thereof; (c) maintaining the mixture of pigment and tetra-amide at a temperature of at least about 100°C and at a temperature of no more than about 200°C for a period sufficient to enable the molten tetra-amide to wet the pigment particle surfaces; (d) subsequent to wetting of the pigment particle surfaces with the molten tetra-amide, adding to the mixture a monoamide; (e) subsequent to addition of the monoamide, subjecting the resulting mixture to high shear mixing; and (f) subsequent to subjecting the mixture to high shear mixing, optionally adding to the mixture additional ink ingredients.

38. (Original) A process according to claim 37 wherein the mixture of pigment and tetra-amide is maintained at a temperature of at least about 120°C for a period sufficient to enable the molten tetra-amide to wet the pigment particle surfaces.

39. (Original) A process according to claim 37 wherein the mixture of pigment and tetra-amide is maintained at a temperature of at least about 140°C for a period sufficient to enable the molten tetra-amide to wet the pigment particle surfaces.

40. (Original) A process according to claim 37 wherein the mixture of pigment and tetra-amide is maintained at a temperature of no more than about 150°C for a period sufficient to enable the molten tetra-amide to wet the pigment particle surfaces.

41. (Original) A process according to claim 37 wherein the mixture of pigment and tetra-amide is maintained at a temperature of no more than about 140°C for a period sufficient to enable the molten tetra-amide to wet the pigment particle surfaces.

42. (Orlginal) A process according to claim 37 wherein the period sufficient to enable the molten tetra-amide to wet the pigment particle surfaces is at least about 0.5 hour.

43. (Original) A process according to claim 37 wherein the period sufficient to enable the molten tetra-amide to wet the pigment particle surfaces is at least about 1 hour.

44. (Original) A process according to claim 37 wherein the period sufficient to enable the molten tetra-amide to wet the pigment particle surfaces is at least about 2 hours.

45. (Original) A process according to claim 37 wherein the period sufficient to enable the molten tetra-amide to wet the pigment particle surfaces is at least about 5 hours.

46. (Original) A process according to claim 37 wherein the period sufficient to enable the molten tetra-amide to wet the pigment particle surfaces is at least about 10 hours.

47. (Original) A process according to claim 37 wherein the mixture of pigment particles and tetra-amide is subjected to high shear mixing prior to addition of the monoamide.

48. (Original) A process according to claim 37 wherein the mixture of pigment particles, monoamide, and tetra-amide is subjected to high shear mixing at a rate of at least about 1,000 rpm.

49. (Original) A process according to claim 37 wherein the mixture of pigment particles, monoamide, and tetra-amide is subjected to high shear mixing at a rate of at least about 5,000 rpm.

50. (Original) A process according to claim 37 wherein the mixture of pigment particles, monoamide, and tetra-amide is subjected to high shear mixing at a rate of at least about 7,500 rpm.

51. (Original) A process according to claim 37 wherein the mixture of pigment particles, monoamide, and tetra-amide is subjected to high shear mixing at a rate of no more than about 20,000 rpm.

52. (Original) A process according to claim 37 wherein the mixture of pigment particles, monoamide, and tetra-amide is subjected to high shear mixing at a rate of no more than about 15,000 rpm.

53. (Original) A process according to claim 37 wherein the mixture of pigment particles, monoamide, and tetra-amide is subjected to high shear mixing at a rate of no more than about 12,500 rpm.

54. (Original) A process according to claim 37 wherein the mixture of pigment particles, monoamide, and tetra-amide is subjected to high shear mixing at a tip speed of at least about 7 meters per second.

55. (Original) A process according to claim 37 wherein the mixture of pigment particles, monoamide, and tetra-amide is subjected to high shear mixing at a tip speed of at least about 12 meters per second.

56. (Original) A process according to claim 37 wherein the mixture of pigment particles, monoamide, and tetra-amide is subjected to high shear mixing at a tip speed of no more than about 30 meters per second.

57. (Original) A process according to claim 37 wherein the mixture of pigment particles, monoamide, and tetra-amide is subjected to high shear mixing at a tip speed of no more than about 25 meters per second.

58. (Original) A process according to claim 37 wherein subsequent to addition of the monoamide and subjecting the resulting mixture to high shear mixing, a polyethylene wax is added to the mixture.

59. (Original) A process according to claim 37 wherein subsequent to addition of the monoamide and subjecting the resulting mixture to high shear mixing, an isocyanate-derived material is added to the mixture.

60. (Original) A process according to claim 37 wherein substantially no surfactants or dispersing agents are contained in the resulting ink.

61. (Original) A phase change ink set comprising (1) a first phase change ink comprising pigment particles having oxygen-containing functional groups on the surfaces thereof and a first ink carrier comprising a monoamide and a tetra-amide, and (2) a second phase change ink comprising a dye colorant and a second ink carrier comprising the monoamide, the tetra-amide, wherein the first ink carrier contains substantially the same components as the second ink carrier.

62. (New) An ink according to claim 1 wherein the oxidized pigment particles are prepared by treating the pigment particles with nitric acid.

63. (New) An ink according to claim 1 wherein the oxidized pigment particles are prepared by treating the pigment particles with ozone.

64. (New) An ink according to claim 1 wherein the oxygen-containing functional groups on the surfaces of the pigment particles are quinonic groups, lactonic groups, or mixtures thereof.

65. (New) A process according to claim 37 wherein the pigment particles are oxidized pigment particles.

66. (New) A process according to claim 65 wherein the oxidized pigment particles are prepared by treating the pigment particles with nitric acid.

67. (New) A process according to claim 65 wherein the oxidized pigment particles are prepared by treating the pigment particles with ozone.

68. (New) A process according to claim 37 wherein the oxygen-containing functional groups on the surfaces of the pigment particles are quinonic groups, lactonic groups, or mixtures thereof.

69. (New) A phase change ink set according to claim 61 wherein the pigment particles in the first phase change ink are oxidized pigment particles.

70. (New) A phase change ink set according to claim 69 wherein the oxidized pigment particles are prepared by treating the pigment particles with nitric acid.

71. (New) A phase change ink set according to claim 69 wherein the oxidized pigment particles are prepared by treating the pigment particles with ozone.

72. (New) A phase change ink set according to claim 61 wherein the oxygen-containing functional groups on the surfaces of the pigment particles in the first phase change ink are quinonic groups, lactonic groups, or mixtures thereof.